

direct and plain that it serves the purpose of conveying thought without leaving an impression of the manner of conveyance. As in the matter, so in the manner, his personality is not permitted to intrude. He says one thing at a time, and therefore his sentences are short; but he does not exaggerate, and therefore he never indulges in epigram.

A noteworthy feature of the illustrations is the reproduction of a large number of De la Beche's cuts, which are derived directly from the original blocks. All of these are good, and so are the majority of the remaining illustrations, but there is also a considerable number, especially in the chapters on stratigraphy, which are not so distinct as is desirable, and which probably owe their imperfection to the employment of some photo-mechanical process. The typography is excellent, and a page of errata is not called for.

The foot-notes contain a very large number of useful references. These are not mere citations of authorities in support of statements in the text, but are indications to the student of treatises in which he may find the fullest exposition of subjects to which the text introduces him.

G. K. GILBERT,
U.S. Geological Survey

SACHS'S TEXT-BOOK OF BOTANY

Text-Book of Botany, Morphological and Physiological.

By Julius Sachs, Professor of Botany in the University of Würzburg. Edited, with an Appendix, by Sidney H. Vines, M.A., D.Sc., F.L.S., Fellow and Lecturer of Christ's College, Cambridge. Second Edition. (Oxford, 1882.)

THERE are not wanting signs that the study of botany is steadily increasing in this country. An immense number of text-books or manuals have been published in English during the last thirty years on the subject, some of which have been very popular, to judge by the many editions they have passed through. Referring to these introductions to the study of botany in general terms, it was to be noted that they all, in a more or less complete manner treated of the vegetable kingdom from a morphological and classificatory point of view; but that the morphological portions were deficient in clear descriptions or conceptions of the origin or development of the members of the plant's body which they described, and the student who required instruction as to physiological, anatomical, or embryological details, had to look for such in the pages of the botanical periodical literature of the day. Most modern workers in biology will agree that the greater portion of this literature was derived from German sources, and it is scarcely to be denied that the first general compendium of note appeared in the German text-book of Sachs. This work had reached a fourth edition in 1874, but the previous editions had found their way into several of the centres of botanical teaching in Great Britain and Ireland, and had caused a considerable change in the older methods of teaching botany. Still it must have been a matter requiring some courage for the delegates of the Clarendon Press to undertake the costly work of translating, editing, and printing in English this work of Sachs', forming a large octavo

volume of nearly 1000 pages, a text-book one would think far too large and expensive for most ordinary students. This work was, however, issued from the Clarendon Press in the spring of 1875, and it is not without interest to note that for the last two or three years it has been completely out of print, so that the edition must have been exhausted in the course of the first four or five years after its issue. It was most unfortunate that this edition, so ably translated by Messrs. Bennett and Thiselton Dyer, had not been based on the fourth German edition, which had been published nearly a year before the English translation made its appearance. The success of the translation may, however, be looked on as to a certain extent condoning this misfortune, and there can be doubt as to the revolution in the study of botany in these kingdoms, which has been brought about by its appearance. Instead of to an endless catalogue of under- and above-ground forms of stems, instead of a list as long as that of the ships in Homer of the forms of simple and compound leaves, the student has had his attention—at least in some schools—called to the important structures to be met with in these varied portions of a plant and to their peculiar functions and ontogeny. The subject of plant life and development seems to have become of more especial interest and to have fallen like a new story on many even old ears. It was not, under these circumstances, surprising that a new edition was called for, but it did excite some surprise that, having in a great measure made the demand, the Delegates of the Clarendon Press seemed unable for a time to supply it, and let several Long Vacations glide by without its appearance; even this new edition comes to us late in the autumn season of the year, when the year's fruits have been well garnered in. Still it is welcome as an important contribution to the study of a science that has of old and for long been fostered by the University of Oxford.

Welcome as this new edition is, it would, we firmly believe have been a much more complete text-book and have reflected more of credit on the Clarendon Press Series, if the present Editor had been given a fairer field to work on. Although the fourth German edition was in advance of the previous one, yet the half-dozen years that have elapsed since it made its appearance have been years during which botany has advanced with no tardy footsteps. Even Prof. Sachs himself could not be persuaded to face the torture of a fifth edition of the original, for he felt, as he tells us, that the expanded views of the present period would not even fit into the framework of his text-book, so that a faithful translation of the fourth edition is even more out of date in 1882 than the translation of the third edition was in 1875.

Hence it must have been distressing for the Editor of the volume before us to find, on entering on his task, that nearly the whole of Book I., which treats of the general morphology of the cell, the tissues, and the external conformation of plants had been for some time in type, and that consequently a number of recent discoveries had not been noticed in it. No one could have been better fitted than Mr. Vines to have brought this most important section up to date, and it is a pity that only 32 out of its 232 pages were reprinted, for there is a decided awkwardness in looking in an appendix for supplementary

remarks which are often found to explain away or totally alter the meaning of the text.

As it is, we would emphasise the prefatory remark of the Editor, that "the Appendix has come to be an important feature" of the book, and is to be especially recommended to the notice of the reader. The student who will judiciously introduce the new material in this appendix into the older structure in the text will be afforded a tolerably clear insight into the present standpoint of vegetable morphology.

Book II. forms the largest third of the volume, and from a purely critical point of view, was the least satisfactory portion of the original. No doubt it was by far the most difficult portion to condense into any reasonable compass, and it bristled with unknown quantities and controverted points, and indeed it may well be doubted if the immense subject of "General Morphology and Outlines of Classification" could be fairly well mastered by any one botanist. That the editor has added a great deal of new material—no doubt assisted by some whose criticisms and suggestions he gratefully acknowledges—is, on the face of this second book, abundantly clear. That a good deal might have been still added is also, on a little examination, made apparent. Detailed criticism on this portion of the volume would be here to a large extent out of place, and serve no good end, but as a justification of these remarks we would observe that among the very first forms alluded to—the Protophyta arranged under the Cyanophyceæ—of which the Nostocaceæ form a highly interesting group—the description of the formation of the Nostæ filament, though amended, as noted within brackets, is, despite the warning of Bornet, founded on a misconception of Thuret's account. In a footnote, too, we read that Archer has described the occurrence of spores in *Nostoc paludosum*, as if this were something novel, but their appearance in many species has not only been known to but made even a factor in their classification by Bornet. It seems inexplicable to us why this distinguished author's works should be so little known to English writers, but so it is, and on turning over page 247 to see what would be said about the Rivulariaceæ—the Scytonemaceæ—we felt disappointed at not finding even a reference to show the student how much has been done by Bornet in recent years to add to our knowledge of these groups. To these remarks we will only add that the large and important groups of Palmellaceæ are dismissed in a paragraph of ten lines. In order that these remarks may not be mistaken, we may observe that we did not expect to find more than a sketch of the natural history of the forms to be found in these groups lying at the base of chlorophyllaceous life, but we did expect that what was narrated of these would be exact, and that a reference to the latest literature of the subject would be given. It would be easy, at least among the Thallophytes, to extend these criticisms. Such an excessively interesting algal form as Pithophora is nowhere alluded to, though its first birth-place seems to have been our Royal Gardens at Kew. Wittrock's paper on this form was fully as important as his on Mesocarpeæ. Nor is the student referred under Fucoidæ to the splendidly illustrated work on the group by Thuret and Bornet; but criticism is not our object, and we gladly pass from the notice of

Book II. to notice Book III., from which, knowing the excellent work done by the Editor in vegetable physiology, we expected great things, nor have we been disappointed. It seems to us an excellent account of vegetable physiology, with all or most of all the modern discoveries alluded to, and we know of no compendium on the subject at all approaching to it.

Should in another four years this second English edition be sold out, let us hope that Mr. Vines will, like its author, cease trying to mend the old garment, but will of his own energy and knowledge give us an Introduction to the Study of Botany, which we doubt not would be worthy of appearing as one of the Clarendon Press Series, and which will wipe away the reproach, true to this of physiological botany as of the drama, that we are forced to fly with all too borrowed plumes.

E. P. WRIGHT

RECENT ELECTRICAL PUBLICATIONS

Electricity. By Robert M. Ferguson, Ph.D., F.R.S.E., of the Edinburgh Institute. New Edition, revised and extended by James Blyth, M.A., F.R.S.E., Professor of Math. and Nat. Phil. in Anderson's College, Glasgow. (London and Edinburgh: W. and R. Chambers, 1882.)

Electric Illumination. By Conrad Cooke, James Dredge, M. F. O'Reilly, S. P. Thompson, and H. Vivarez. Edited by James Dredge. Chiefly compiled from *Engineering*. With Abstracts of Specifications, prepared by W. Lloyd Wise. Vol. I. (London: Office of *Engineering*, 1882.)

PROFESSOR BLYTH has done good service by the judicious additions which have to a great extent revived Dr. Ferguson's well-known little manual, and brought it up to the level of the times.

The actual progress in electrical science since the original book appeared has not been anything extraordinary, but the amount of it which the public are willing to learn has undergone a prodigious increase, and the modern text-book is therefore expected to enter into details about a number of matters which a few years ago would have been scouted as altogether too difficult. It is these semi-advanced portions which Prof. Blyth has incorporated with the old stock of the work, the stock remaining about the same. There was very little to which one could object in the original; if it erred, it erred as a rule only by omission. In the new edition, however, we have information, and though concise it is mostly good and reliable information very intelligibly expressed, concerning Sir Wm. Thomson's electrometers, mariner's compass, and thermo-electric discoveries, also concerning electrostatic and electromagnetic induction, and other matters which had been but very lightly glanced at in the original edition. It also refers to Mr. Crooke's experiments, Mr. Spottiswoode's coil, Prof. Tait's thermo-electric diagram, and Dr. Kerr's discoveries. The operation of making a text-book may be compared to the operation of skimming, and the depth to which this operation may be safely carried depends, we suppose, mainly on the taste of the public at the time. Prof. Blyth has added to Dr. Ferguson's original skim a slightly deeper and more substantial layer; and fortunately neither of the authors have